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A SECOND REVIEW OF MELINÆA AND MECHANITIS (LEPIDOPTERA, ITHOMIINÆ)

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Some years ago I published summary revisions of these two genera.¹ Since then considerable more material has been seen, and there has been a good deal of activity in the Ithomiinæ, which cannot be completely reviewed here; but the following notes appear of value to the writer. There has still been no line-breeding in either of the two genera, and we have no more knowledge than before as to the species or varietal status of many of the names: on the contrary some of the specimens showing intermediate patterns throw doubt on the analysis presented before without any indication of a better solution.

Indebtedness has as usual been too wide to acknowledge in full detail. It includes the plate of British Museum types, and further data on the types from N. D. Riley of the B.M., loans from Pittsburgh, the American Museum, the National Museum, Cambridge and Philadelphia, and from Dr. Pablo Anduze of material destined for the Museum of Natural History at Caracas; also courtesies at visits to most of the museums of the east, and to the British Museum, Tring and Oxford in England.

Melinæa

Within this period the following names have been added to our list.

¹ Jour. N. Y. Ent. Soc., 32: 145-157, 1924; 35: 23-36, 1927.

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agricola Hall, Ent., 68: 227, Pl. 6, fig. 6, 1935; from Ega. I have discussed this as a very striking race of *mneme* (*crameri*) (Bull. Ent. Ven., 1: 28, 1942).

aurantia Forbes, Bull. Ent. Ven., 1: 27, 1942. Venezuela, possibly Colombia. Also considered a striking race of *mneme* (Fig. 3).

borealis Hall, Ent., 68: 226. Venezuela. As described, a race of *mæonis* with areas across cell of fore wing and through cell of hind wing yellowish. From the locality this should be the same as the form considered *zamora* in my revision, but Hall does not mention the linear border of hind wing. Our specimen is from Mucuchachi, and may be considered a topotype.

eratosthenes Hall, Ent., 68: 227, pl. 6, fig. 5. French Guiana. I have discussed this very distinct species, which also occurs in Venezuelan Guiana, in Bull. Ent. Ven., 1: 26, 1942.

erica Bargmann, Ent. Anz., 9: 141, 1929. Rio Dagua, West Colombia. See below.

ezra Fox, Ent. News, 50: 72, 1939. See below.

incisa Kaye, Proc. Ent. Soc. London, 1925, xxiii. A variant of *mneme* (*crameri*) with the black of hind wing divided into two patches.

juruaënsis D'Almeida, Papeis Avulsos Dep. Zool. (S. Paulo, Brazil), 3: 165, 1943 (fig.). See below.

lateapicalis Hall, Ent., 68: 227, 1935. Mérida, Venezuela. See below.

limitata Hall, l.c. Synonym of *mneme sola* Kaye, which is a race of *lilis*, not *mneme*. See below.

lutzi Fox, Am. Mus. Novit., 1194: 1, fig. 2, 1942. A race of *lucifer* Bates, *nec auct.* (l.c., fig. 1) from the Upper Marañon. See below.

purusana Riley, Ent., 52: 181, 1919 (*purusana* Aurivillius, Ent. Tid., 50: 155, 1929, *romani* Bryk) Rio Purus, Amazons. A race of *madeira*, with base of cell and cell Cu_1 solidly black, followed by deep red-brown, with little or no yellow scaling in cell Cu_1 ; but hind wing with black markings reduced. The Carnegie Museum series of this form is from Nova Olindia, Rio Purús.

rileyi Fox, Am. Mus. Novit., 1194: 3, 1942. Upper Amazon Basin. The form of *marsæus* commonly called *lucifer* on the basis of Staudinger's misdetermination.

romani Bryk, Lep. Cat., 80: 641, 1937. See *purusana*.

sola Kaye, Trans. Ent. Soc. London, 1924, 413; Mem. Dept. Agr. Trinidad and Tobago, 2: 16, pl. 1, fig. 5, as *tachypetis* in error. This has none of the special features of *mneme*, as described; I am treating it as a race of *lilis*. See below. *Limitata* Hall is the same form, described from Venezuela.

M. erasthenes and the true *M. lucifer* show a feature that is otherwise unknown in the genus, namely a series of unpaired submarginal spots, which lie a little further basally than the usual paired ones, and in *erasthenes* take the place of the usual subapical patch or bar. So they should be inserted in the key just after *egina*, in some such way as follows:

- A₂. Fore wing with unpaired white or yellow submarginal spots.
 - B. A complete series of five or six spots on fore wing, replacing the subapical bar, spots also present on hind wing *erasthenes*.
 - BB. Two or three spots on fore wing only near middle of outer margin, and a large separate subapical patch *lucifer*.
 - C. Light areas in end of discal cell, cell Cu₁ and submarginal spots largely yellow (Upper Marañon in Peru) *l. lutzi*.
 - CC. These areas largely or wholly tawny (Upper Amazons in Brazil).
l. lucifer.
- AA₂. No unpaired submarginal spots.

Considering the wide variation in the genus it is really not impossible that *lucifer* and *erasthenes* are subspecies of the same species, from the Amazon Basin and Guiana, respectively.

The name *purusana* was used twice in the genus, by Riley and Aurivillius; fortunately according to Fox (Ann. Carn. Mus., 29: 397, Pl. 1, fig. 1) they are the same form. The general effect is closely that of the Venezuela specimens I take to be *zamora* (presumably also *borealis* Hall), but the ground is much darker, the median band on hind wing is partly broken into spots, and the border a little broader.

On *macaria* and *egesta* G. & S., I have nothing to add to Fox (Am. Mus. Novit., 1941: 1) nor anything to say about *brunnea* and *strigilis*, omitted before from complete lack of data.

M. lilis. Additional material has given quite a different appearance to this species and a new key to races and forms is in order. Four of the names represent single small lots taken each on a single occasion: *erica*, *dodona*, *lateapicalis* and *ezra*. Of

these, *ezra* is not from the Magdalena basin, as one might assume from the published locality, but the northwest corner of the Sierra Marta; *erica* takes an intermediate position between two main series of races, and as it should be, was taken in western Colombia. *Lateapicalis* may well represent a mere field-form, but the residue are well defined races, though the blend-zones are sometimes broad (as with *flavicans* and typical *imitata*).

- A. Apical half of fore wing black, with the pm. and st. bands represented by series of white spots; tawny basal area extending broadly to inner margin.
- B. Hind wing with a longitudinal black median band *parallelis*.
- BB. Hind wing with only outer half of band visible *messatis*.
- AA. Light portions of apical half of fore wing yellow; basal half with inner margin black, or at least a black band along anal vein.
- B. Outer margin of fore wing with conspicuous double white marginal dots.
- C. Outer part of wing with a continuous postmedial yellow band, at least down to vein M_2 ; inner margin of fore wing tawny at base (Rio Dagua, Col.) *erica*.
- CC. Postmedial fascia represented by four separate spots, as in *l. messatis*; inner margin broadly black (not seen) *dodona*.
- BB. Outer margin of fore wing above without marginal white dots, or at most with a few scattered ones (*lilis*); postmedial fascia continuous down to M_2 and almost always much farther; base of inner margin broadly and solidly blackish.
- C. Fore wing with yellow postmedial band broad and continuous, more than half as wide as distance from it to apex, broadly connected to the tawny base, the black at end of cell only extending a little below lower angle of cell (Venezuela and Trinidad).
sola (limitata, tachypetis).
- CC. Fore wing with the black band across end of cell extending far out in cell M_3 , cutting the postmedial fascia almost or quite completely off from the tawny basal area; pm. fascia narrow and often broken.
- D. Subapically with the pm. and st. spots of each cell fused into a long streak, except for a small black spot in cell R_5 (Mérida, Venezuela) *lateapicalis*.
- DD. Pm. fascia narrow and zigzag or interrupted, separated from the st. spots by an area which is black on costal half of wing, black or tawny on inner half.
- E. Fore wing with a continuous black stripe from base of costa, out through cell, and along upper side of Cu_1 half way or more to margin; apical markings of fore wing pure yellow.

- F. Hind wing with a yellow median stripe, as in *M. ethra*.
flavicans.
- FF. Hind wing with ground concolorous tawny *imitata.*
- EE. Fore wing with this stripe interrupted at lower angle of cell;
 yellow markings in apical area normally more or less
 edged or shaded with tawny.
- F. Black bands across end of cell and between the postmedial
 and subterminal yellow spots, both interrupted with
 tawny submarginally, leaving only black marginal tri-
 angles (Santa Marta) *ezra.*
- FF. Black bar across end of cell shortly interrupted in cell M_3
 (type) or complete, the one between the pm. and st.
 yellow spots complete *lilis.*

Kaye's figure of *sola*, cited above, was published under the name of *tachypetis* in error, and I have seen material determined with that name. I can see no significant difference between it and a specimen from El Chorro, Sucre, Venezuela, which may be considered typical of *limitata*.

Bryk, in the Lep. Cat., missed the original description of *M. l. flavicans* Hoffmann. It was Rev. Mex. Biol., 4: 70, 1924. As Hoffmann reported it, it is definitely racial in the northern part of its range (which includes Nayarit), but appears further south as a casual variant. *M. l. erica* Bargmann is also imperfectly racial according to its describer. The single specimen I have seen is in the Rothschild collection, standing as *dodona*, which is really very close.

Under *Melinæa egina*, Tessman has described *manuelito*, as probably a race. I have seen it in the Rothschild collection, from the Rio Palcazú, and a transitional specimen in the Reading Museum from the R. Huallaga; and agree with Tessman, so in place of *paraiya* in my key there should stand:

- C. Fore wing with a broad median yellow fascia across end of cell;
 only two postmedial yellow spots, the middle one being missing
 (S. Brazil) *e. paraiya.*
- CC. Fore wing tawny medially with only a slight paler shade at the
 outer end; three pm. spots, as in typical *egina*; last two spots
 on hind wing placed transversely (Peru) *e. manuelito.*

The Reading Museum specimen of *manuelito* has the proper black pattern, but the yellow postmedial fascia of the fore wing is preserved.

Melinæa mænius. While in its normal condition this appears to be a quite distinct species from *menophilus*, being somewhat larger as well as having a different comma-mark, the Reading Museum has every possible intergrade in a series of specimens with the typical *menophilus* coloring, finally with the exact pattern of *mænius chincha*, but the yellow pm. band of *menophilus*. One specimen at Cornell is exactly of this type, and was taken at Chuchurras, not far from Pozuzo, Peru, the type locality of *chincha*. The question what constitutes a species becomes more difficult than ever.

M. menophilus. In the key, instead of *zaneka* should be substituted:

- B. . . . , or with limited and diffuse median spots.
- C. Fore wing with yellow pm. fascia.
 - D. Black of inner margin of fore wing a narrow streak a little back from margin; hind wing without median spots *zaneka*.
 - DD. A very heavy black fascia along inner margin of fore wing, hind wing with four diffuse black spots *juruaënsis*.
- CC. Fore wing without yellow markings; with heavy fascia like *juruaënsis*; hind wing without spots *clara*.

Melinæa isocomma, new species (Fig. 2; holotype)

Closely related to *M. comma* Fbs., but with the size and coloring of *M. menophilus messenina*. Male fore tibio-tarsus slightly more than half as long as femur plus trochanter (equal to the longest condition in *M. comma*, much longer than in *egina*). Friction area on fore wing above A with narrow hair-scales, like *messenina*, etc., unlike *comma*. Male genitalia normal.

Head and body pattern normal, the present specimen with tawny only on collar, sides of tegulæ and a slight shade on posterior face of thorax, but probably variable, as in other species of *Melinæa*. Yellow middorsal line and line across back of mesothorax stronger than in *messenina* specimens with an equal amount of black on wings.

Fore wing above black at base to a third way out near costa, a little beyond fork of Cu along lower side of cell and to two-thirds on inner margin; vein R tawny and with long pointed extensions of the tawny extending nearly to base along costa and Cu. Median area light tawny (the same color as *menophilus*, etc.), out as far

as the cell spots, vein Cu_1 and the comma-mark; marked by a black spot over fork of R_1 which is narrowly outlined with tawny, a spot over the lower discocellular vein, filling lower angle of cell, and a rather rounded spot in the fork of Cu , not filling the angle. Comma-mark with its upper end tangent to Cu_1 , definitely diverging from it to outer margin, and leaving a full quarter of that cell yellow at outer margin (unlike all other *Melinæas* at hand), the inner and marginal portions connected at their upper edges by a fine and faint black line. Marginal patch smallish, subtriangular, *separated from margin* except at its upper end by a tawny stripe, not nearly reaching up to Cu_1 , nor quite down to Cu_2 . Tawny area reaching outer margin, except for the black terminal line down to the fold, and black fringe; even the latter being interrupted with tawny at anal angle (unlike *M. comma*, where it is continuous). Yellow postmedial fascia wide, more than half as wide as the following apical black area, and hardly narrowing to the outer margin, its inner boundary normal, but its outer boundary toothed out on R_1 and Rs , squarely lobed on M_1 , with a rounded extension on M_2 , and with a long tooth reaching far toward margin on M_3 (the last unlike all other *Melinæas*, but perhaps not a trustworthy character). Terminal end of fascia separated from margin only by a narrow black terminal line, for some distance both above and below Cu_1 , therefore ending squarely, unlike all other *Melinæas* at hand. Apex solid black. Hind wing brown-black; costal area dirty gray-brown, costal pencils cream; a small tawny apical patch with irregular but generally erect inner boundary from costal area to tip of Cu_1 , continued as a fine terminal line halfway to Cu_2 , and interrupted by a small black spot in tip of cell M_1 . Fringe all black.

Under side approximately as above, fore wing with the comma-mark with even less black; inner margin below Cu and Cu_2 light tawny, but with a blackish streak along base of Cu . Hind wing with apical patch continued narrowly along costa toward base, then widened and overlaid with yellow on basal quarter, the small black apical spot covering cell R as well as M_1 . Expanse 87 mm.

Upper Rio Negro in Colombia (Fassl); 1 male holotype in collection of Cornell University. The specimen is labelled 800 M., but the greatest height shown in that part of Colombia on the

"Millionth" map is 700 M., and the highest near the Rio Negro 300 M., or less. I think I have seen other specimens with nearer the *chinch*a coloring, but have no notes.

In my key the species will run to *comma* on the shape of the comma-mark, length of fore tibia and marginal tawny in cell Cu₁ of fore wing; but the pattern is entirely different from our series. The specimen figured by Poulton from the Oxford collection, Trans. Ent. Soc. London, 1908, Pl. 33, fig. 1, should be examined. It is of the purely black and red *mothone* coloring. This form may possibly be a hybrid of *comma* and *messenina*. *M. isocomma* and *comma* may be separated in the key as follows:

- C. Smaller (expanse 3 in.); yellow or possibly tawny area preceding the black apex toothed out slightly on M₃, ending roundly along Cu₁; tawny area at tip of cell Cu₁ below enclosed in black; anal fringe black (Fig. 1) *comma*.
- CC. Larger (3½ in.); yellow preceding the black apex toothed out almost to margin along M₃, ending squarely and separated from margin by only a black line both sides of vein Cu₁; tawny area at tip of cell Cu₁ broadly connected below with the tawny ground; fringe cut with tawny at anal angle (Fig. 2) *isocomma*.

The preceding notes by no means exhaust the possibilities of variation in the genus, and the following further oddities may be cited from the Cornell collection.

In the *M. mneme* complex, Fleming of the Tropical Research Station has taken several more specimens of *aurantia* at Caripito, Venezuela, and finds an occasional specimen transitional to typical *mneme*. The most striking, now in our collection, has gone about half way to *mneme*, having the apical border of fore wing solid black, the postmedial area black with only subordinate brown scaling, and the black of hind wing extended to cover about half the area, including broad stripes in the costal part of the discal cell and cell M₁. Another interesting intermediate comes from the Fassl collection; it was taken on the Rio Songo, Bolivia, along with normal *satevis*, but is much paler though without any more yellowish tint, and the yellow pm. band obliterated by the light reddish ground; the black pattern is quite normal for *satevis*.

A specimen—also from the Fassl collection—was taken at Villavicencio, E. Colombia. It agrees with the telegraphic description of *macaria* G. & S., described from the same region, but shows the

hook in cell Cu_1 of fore wing crossing the vein, and so should fall to *marsæus* rather than *menophilus*. We obviously need a redescription or figure of the type. If this is really *marsæus*, the key to the forms of the latter species should be modified as follows; in place of the misdetermined "*lucifer*":

- C. Postmedial area tawny; subapical patch large and contrasting (yellow), of four fused spots *m. rileyi* Fox (*lucifer*†).
 CC. A contrasting yellow postmedial fascia; the subapical spots only three, and the two lower small, the last in our specimen visible only below *m. macaria* (supposition).

Another specimen from the Rio Madre de Dios in southern Peru shows the fore wing pattern of *marsæus*, but wholly lacks yellow, the basal two-thirds of the fore wing being black on an even tawny ground, and the apical third solid black; while the hind wing is wholly tawny except the usual blackish shading below the costa and a fine black fringe.

It has not been noted, I think, that the sex-tuftings on the costal area of the hind wing above show some variation in this genus. In the normal group they are so variable individually as to give little help in identifying species, but *eratosthenes* and *comma* stand out in the very small first pencil, with the second starting much nearer the base than usual in *eratosthenes*, actually before the point of origin of Cu_2 . In the other species, even *egina*, tendencies are shown at most. Our specimen of *borealis* shows much more space between the two pencils than the other *maëlus* specimens, which rather consistently have a moderate first pencil, with only a short gap beyond it; the *lilis* complex also fall rather definitely into two groups, the first pencil being much more massive and second further out in *messatis* and *parallelis* than the more northern types, while *scylax* stands between them. The most variable species, to judge by present specimens is *menophilus*, the most constant (of which more than two specimens were examined), *maëlus*.

The development of the male fore leg is equally variable, and further shows frequent asymmetry. Here it is *egina* which shows the most constant difference, the fore tibio-tarsus being only about one-fourth as long as the femur with trochanter; *comma* comes next, with the tibio-tarsus from half to two-thirds as long, while

it is longer in the residue; but occasional specimens show very short tibiae on one or both sides, and one *idæ* actually matches the shortest *comma*. The single specimens of *eratosthenes* and *isocomma* agree with the longest *comma*, but are matched by one *menophilus* as well as the *idæ* just mentioned, and approached by several more. The most striking case of asymmetry was a *mænius chinchæ*, with the femur twice as long on one side as the other, but somewhat less difference in the tibio-tarsi. The character may be of some use in separating *mænius* and *menophilus*, which generally have fore femora-trochanters shorter and longer than 0.046 length of fore wing, respectively.

The third neglected character is the scaling of the friction area on the under side of the fore wing above A. In most of the species this area is clothed with slender deciduous hair-scales, which are lost, exposing the glossy membrane, in somewhat rubbed specimens; but in *comma* and *eratosthenes* the scales are broader, more firmly attached, and match the yellow or tawny general wing surface in color. *M. egina* has dense scaling like the rest of the wing, with both under- and overscaling; but *menophilus* and *isocomma* have the fine-spaced deciduous hair-scales.

Mechanitis

In this genus most of the new data are on local variation in the *polymnia* complex. Longer series have given a better idea of the racial pattern, but some intermediates have appeared that can hardly be placed in any workable key. The following names come under consideration, partly recent, and partly which I was unable to place when the first paper was written:

angustifascia Talbot, Trans. Ent. Soc. London, 76: 411, etc., Pl. 14, figs. 7, 16; 16, figs. 4, 7, 1928. An isolated colony nearest *p. polymnia*, with the black costal stripe on hind wing below much narrower. Rio Serragem, Matto Grosso.

argentea Prüffer, Tow. nauk. Warsz., Arch. nauk. biol., 1(2): 5, pl. 2, fig. 3 (not no. 1 as stated in Bryk, but no. 2). Peru. A variant of *eurydice*, lacking yellow on the hind wing like most specimens of *eurydice* from the limits of its distribution (Coroico, Bolivia, and La Chorrera, Rio Putumayo), but with distinct white marginal spots, as frequently in the Chanchamayo. Type locality

the Marañon above Iquitos. The relationships between these northern *eurydice* forms and the *doryssides* of the vicinity of Iquitos are worth study.

blissi Fox, Sci. Publ. Reading Mus., 4: 26, 1942. A Central American race of *macrinus*, almost completely lacking the yellow postmedial fascia.

californica Reakirt. I cannot see any validity to this name, which is based on typical *isthmia*.

connectens Talbot, Trans. Ent. Soc. London, 76: 412, etc., Pl. 14, fig. 8; 16, figs. 2, 8. Rio Serragem, Matto Grosso, with *angustifascia*. A form of *elisa* with the yellow spot in Cu_1 large, crossing vein Cu_2 and resting solidly on the discal cell like *ocona*, but without the oblique pm. streak which is always present in male *ocona*.

contracta Riley, Entomologist, 52: 182, 1919 (figs. 14, 15, types). Rio Purus. Close to *egaënsis* Bates, but differing in the subapical band being clear yellow without reddish, and narrow border of hind wing. Rio Purús.

egaënsis Bates, Trans. (not Proc.) Linn. Soc. London, 23: 531, pl. 56, fig. 7a. This name was based on an array of specimens from Ega (approximately modern Teffé). His typical lot were very dark, wine-colored, and not very distinct from what Butler afterward described as *obscura* (figs. 16, 17, types). His var. no. 1 was described as paler and yellower, with markings more like *polymnia*, and therefore quite unlike the specimens which Butler considered to be number 1 and named *obscura*. His number 2, of course belongs to *olivencia*.

elevata Riley, Entomologist, 52: 182, 1919 (figs. 12, 13, types). This was taken with *contracta* and raises a problem, since it would generally be considered a separate race of *mazæus*, and in fact similar specimens occur rather widely outside the area of wine-colored and red-brown forms. We have it from Teffé, where again it occurs with the wine-colored *egaënsis*.

escalantei Hoffman, Anales Inst. biol. Mexico (Univ. nacional), 11: 636 (with figure). An aberration of *doryssus saturata* with the apical half of wing almost solid black, containing two post-medial and the subapical yellow spots. (Guerrero, Mexico.)

extrema Hoffman, l.c. (with figure). An aberration of *doryssus* with the comma-mark and spot in base of cell Cu_1 absent,

leaving the whole area between the cell and the black marginal markings tawny. (Southern Chiapas.)

forbesi Bryk, Lep. Cat., 80: 491, 641 (not in index). A pure synonym of *limnæa* Fbs.

limnæa Forbes, Jour. N. Y. Ent. Soc., 38: 317. See below.

obscura Butler, Cist. Ent., 2: 149. (Figs. 16, 17, types.) Stated to be a new name for *egaënsis* var. 1 Bates, Tr. Linn. Soc. 23: 531, but as shown by the types much more nearly representing dark specimens of the typical race.

ovata Distant, Pr. Ent. Soc. London, 1876: 11. Kept as a Costa Rica race by Bryk, but there is every reason to consider it a mere synonym of *lycidice*, following Godman and Salvin.

peruana Hopffer, Stett. Ent. Zeit., 40: 419. Tawny area in disc of hind wing narrow and yellow edged with tawny, instead of broad and tawny. A mere variant of *menapis*, which we have from Colombia with both the *franisi* and *menapis* type of border.

plagigera Butler, Cist. Ent., 2: 150. One of the chestnut Amazon forms, the description totally inadequate to place it in *polymnia* or *mazæus*.

septentrionalis Apolinar. Placed with *egaënsis*. Fox informs me this is an earlier name for *caucaënsis*.

syloanoides Godman and Salvin, Trans. Ent. Soc., 1898: 110. Listed by Bryk as distinct, but clearly a pure synonym of *equicola* as noted by d'Almeida in Lambill. 39: 81. Both are from Guiana, not Ega as stated by Bryk.

visenda Butler, Cist. Ent., 2: 150 (fig. 11, type). See below.

wernerii Hering, Iris, 39: 188. The West Colombian representative of the normal group, discussed under *mazæus*.

williamsi Fox, Sci. Pub. Reading Public Mus., 2: 6, 194. A *mazæus* race from northeastern Peru. See below.

I now have the female of *equicola*, and have examined that of *proceris* in the British Museum; both have the long-stalked R and M₁ in the hind wing, like the species I called *truncata* (which I should have called *olivencia*, since Bates's second form of "*polymnia*" definitely belongs to this species). Alternative 5 of my key should be recast, since the distinctive Upper Amazon ground color is the best character to use. Read in place of the second alternative 5:

5. Postmedial area of fore wing wholly brown or tawny or with a little yellow toward costa 5½.
 5½. Ground color deep red-brown *o. olivencia*.
 5½. Ground color bright tawny *o. huallaga*.

Our normally colored *o. huallaga* is from southern Peru; a specimen from the Ucuyali (received as *fallax*) is a general intermediate, with the ground tawny like *huallaga* and *truncata*, but appearing extensively in the apical area, like *olivencia*, the post-medial area rather heavily shaded with yellow (without a clearly defined yellow area) and the median band of hind wing broad and even, instead of narrow and waved or absent.

M. proceris. The male genitalia are like those of *olivencia*; also barely distinct from the normal group.

M. polymnia. Additional material of this species and the *mazæus* complex, among them a block of *caucaënsis* from the Fassl collection, make the definition of this species more difficult than ever, yet there are enough places where members of both these complexes are found side by side (see maps), to indicate pretty strongly that there are really two species. The localities from which I have examined pairs of populations that appear to belong to these two species are Venezuelan Guiana, the Tumatumari in British Guiana, Paramaribo in Dutch Guiana, and the lower Maroni in French Guiana, also several points on the middle and lower Amazon. In northern Venezuela a block of specimens from the State of Sucre (Fig. 5) plainly belong to a distinct race of *polymnia*, while a colony from Caripito in the plains a short distance south, as obviously belong to *mazæus* (Fig. 6; near *m. elevata*), and the two colonies may very probably overlap. The dominant *Mechanitis* in northern Venezuela is of course a race of *doryssus*, which also reaches Trinidad. From the eastern slopes of the Andes I have only seen *mazæus* types, usually coexisting in any given place with a colony of *doryssus* or *doryssides*; but the three forms seen from the western Andes are unique: *chimborazona*, from western Ecuador has the pattern of *polymnia*, while *wernerii* from western Colombia comes closer to *mazæus*; both have lost the median band of the hind wing on the under side and upper side of the female, like *macrinus* from the same area, and many specimens of *lycidice* (and *isthmia*) from a little

further north. It looks as if there must have been some interbreeding and transfer of genes, if not an actual break-down of the species character. The Cauca Valley race (*septentrionalis*, i.e., *caucaënsis*) goes in another direction. By the black pattern it also suggests *mazæus* more than *polymnia*, but has almost the deep coloring of a middle Amazon race.

To fill out the picture of *polymnia*, alternatives 10 and 11 of the key should be replaced by the following:

10. Hind wing on both sides in female and under side in male with the post-medial band reduced to a fragment, or lost, but broad on upper side in male 10a.
10. Hind wing with black medial band as strong below as above and alike in both sexes; yellow pm. band of fore wing about as broad at margin as at end of cell 11.
- 10a. Two small well separated black spots at end of cells; pm. band much narrowed toward inner margin (Western Ecuador).
p. chimborazona.
- 10a. A heavy black bar at end of cell; pm. band not narrowed at inner margin (western Colombia) *m. weneri*.
- 11.² Yellow postmedial fascia of fore wing very broad, extending $\frac{2}{3}$ way to apex and filling the whole width of cell M_3 toward outer margin; subterminal band strong, partly tawny (NE. Venezuela) (Fig. 5).
new race *solaria*.
11. Yellow pm. fascia of fore wing extending only $\frac{1}{3}$ way to apex, rounded off below and not nearly filling width of cell M_3 , subterminal fascia weaker or obsolete 11a.
- 11a. Median black band of hind wing narrower and waved, fore wing with cell Cu_1 practically solid tawny and black; costal stripe of hind wing below narrow *p. angustifascia*.
- 11a. Median band of hind wing more weakly scalloped across the two uppermost cells only, stripe of hind wing typically broad 11b.
- 11b. Outer third of discal cell largely tawny, cell Cu_1 normally wholly tawny, ground color somewhat deeper tawny (Middle Amazons) (Fig. 4).
p. mauensis.
- 11b. Outer third of discal cell almost wholly yellow, cell Cu_1 heavily shaded with yellow, the tawny ground paler 12.

Another character of considerable racial significance is the black at end of cell; typically there are two separate spots—one out of fourteen from British and French Guiana with the bar, two out of ten from southeastern Venezuela, three out of ten

mauensis (all male), one male out of eleven from the Lower Amazon, but half the females—while all the specimens from southern Brazil, also the three specimens figured by Talbot of *p. angustifascia* and most of the types of *solaria* have the complete bar. The only specimen here of *chimbora zona* has well separated spots. The single specimen at hand labelled Trinidad (Busck) has a bar, though it is otherwise normal *p. polymnia*; one would have rather expected *solaria* in Trinidad, since its special model, *sola*, occurs there.

Mechanitis polymnia solaris, new race (Fig. 5)

Similar to *M. p. polymnia*; postmedial yellow fascia much broader, mimicking *Melinæa sola*; no yellow in cell or only a little scaling, the median yellow showing mainly as a bar on costa; median black spot in cell large and triangular, unlike most specimens of other races; bar at end of cell complete or very shortly interrupted; subterminal yellow band strong, almost as wide as the following black marginal area, often continuous from just below costa to M_2 , but then curving around parallel to the margin below, even on under side, not approximate to margin as usually in *M. m. beebei*, yellow, only narrowly edged with tawny. Expanse ♂ 66, ♀ 76 mm.

El Chorro, Sucre, Venezuela (Anduze) ♂ holotype June 27, ♀ allotype June 23, 1937, in coll. Cornell University; Cumanacoa and Elvecia, near Mt. Turumquire, Sucre (G. Netting), female paratypes in Carnegie Museum.

M. polymnia mauensis, new race (Fig. 4)

Similar to typical *polymnia*, but apparently slightly broader-winged; the tawny ground a shade brighter, and the yellow limited to a postmedian band, there being only a moderate amount in end of cell and none in cell Cu_1 . Two separate spots at end of cell except in three males (including the paratype figured).

I have suspected this was the *egaënsis* var. 1 of Bates (not Butler) and from the very brief description had imagined it might also be the *visenda* of Butler, but the type of the latter (Fig. 11) is a much paler *mazæus* form.

Santarem, Amazons, Brazil, Jan., Feb., 1938, male type and five male and one female paratypes; Maués, June, 1937, one female; Centenario, near Maués, August, 1937, one male; all collected by Wucherpfennig, also one from Staudinger and Bang-

Haas, received without locality, but most probably from Santarem; Teffé, Dec. 18, 1919, one female (Carnegie Museum).

Mechanitis mazæus

Variation in this species is becoming clearer with additional material, and shows the complexity so frequent in South American butterflies belonging to mimetic associations; while variation is chiefly racial, there is always among specimens with the normal coloring of any race, a proportion far from their proper area, especially in the case of the more striking types, so that the distinction of race and dimorphic form becomes nearly meaningless. For instance the *messenoides* coloring (black base and apex of fore wing and hind wing, with half tawny and half yellow median area) is before me from eastern Colombia close to the Cordillera, from far away on the Upper Rio Negro, and also Bolivia, in several specimens each, besides a single specimen from French Guiana; while other color forms occur in each of these localities. The chestnut coloring makes a pretty clear patch on the middle Amazon, but Wucherpfennig also took examples of the bright tawny coloring at Teffé, in the heart of the chestnut area, and Riley's *elevata* and *contracta* occur together on the Rio Purús.

The following revised key (beginning at no. 13 of the old key) includes all the forms credited to *mazæus* by Bryk, except *nesæa*, which is really a race of *lysinnia*.

- 13. Fore wing with ground tawny or red-brown to base, at least in cell 14.
- 13. Fore wing with base solid black, or at most with slight reddish streaks, hind wing all black except apex 181.
- 14. Fore wing with ground of medial and postmedial areas all or nearly all tawny or brown, the subterminal band sometimes yellow.
- 14. Fore wing with a yellow postmedial band or a larger yellow area 18a.
- 15. Apical part of fore wing solid black; the bands of hind wing either separate or fused *m. nigroapicalis*.
- 15. A distinct yellow or tawny subapical band 16.
- 16. Subapical marking a large patch, much wider than the preceding and following black 17.
- 16. Subapical marking a narrow band, much narrower than the preceding and following black areas 18.
- 17. Subterminal band dominantly yellow, the pm. area with considerable yellow scaling though no complete yellow band *m. lucifera*.
- 17. Subterminal and postmedial areas both wholly tawny *m. phasianita*.

18. Subapical band connected or nearly connected with postmedial by tawny suffusion along the outer margin, at least beneath; hind wing in male with black border fading out to apex, in female with long black streaks only in cells Cu_1 and Cu *m. jurimaguensis*.
18. Subapical band ending abruptly both above and beneath, usually at vein M_3 or higher; border of hind wing in male continuous to apex, and enclosing white spots there, in female with a long streak in cell M_3 as well as below Cu_1 *m. mazæus*.
- 18a. Hind wing below in male and on both sides in female lacking the median black stripe, with only a short fragment outward *m. werneri*.
- 18a. Median stripe of hind wing strong in both sexes above and below 18b.
- 18b. Yellow area of fore wing large, covering outer third of discal cell and heavily shading area Cu_1 before the comma, strongly contrasting with the deep brown or mahogany general ground 18c.
- 18b. Yellow in the form of a postmedial band, with only slight shading in outer part of cell, and not dominant in cell Cu_1 ; more extended in some light tawny specimens, but not contrasting 18d.
- 18c. Ground rather lighter; black mark at end of cell in the form of two separate spots *m. septentrionalis (caucaënsis)*.
- 18c. Ground very deep mahogany brown; bar at end of cell complete; or the lower spot very large, 5 mm. long (Fig. 9) *Madeira race*.
- 18d. Ground chestnut or mahogany brown 18e.
- 18d. Ground tawny 18f.
- 18e. Subapical bar wholly yellow, contrasting (Figs. 14, 15, types).
contracta.
- 18e. Subapical bar shaded with red-brown (Figs. 16, 17, types of *obscura*).
m. egaënsis (obscura).
- 18f. Black spot at lower angle of cell and spot in cell, both small, at most 2 mm. in diameter, the spot at upper angle of cell small or obsolete; postmedial band very broad, extending $\frac{2}{3}$ way to apex but without an extension in cell M_3 18g.
- 18f. Spots in cell much larger, and almost always black at upper angle of cell also, yellow band narrower, or less often much extended in cell M_1 18h.
- 18g. Five small black spots in disc, representing the one in cell, costal spot and spot at lower angle of cell, and apex of "comma-mark" (Fig. 11, type) *m. visenda*.
- Only two small black spots on disc, the ones in and at lower angle of cell—the costal one at end of cell being vestigial or absent, and the comma mark fully developed (Fig. 7) *m. bipuncta*.
- 18h. Subterminal bar solid tawny, contrasting with the yellow postmedial band *m. williamsi*.
- 18h. Subterminal band wholly or largely yellow 18i.
- 18i. Hind wing with marginal series of black patches when conspicuous strong toward inner margin above, sometimes fused with median series, but leaving distal part of wing clear tawny, with only a black

- terminal line (beneath much less developed and separate, when present at all) *m. fallax*
- 18i. Hind wing marginal markings in male short, and almost always present at apex, where they often enclose white spots, in female elongate, but not invariably joining the median series unless the black at apex is heavy; about as well developed below as above 18j.
- 18j. Subapical bar wholly yellow (a single exception at hand), rarely extending below M_2 ; hind wing with black very heavy, the median and marginal bands usually fused, and the median when free extending heavily to inner margin (Fig. 10, type) *m. pannifera*.
- 18j. Subapical bar partly tawny at least below; hind wing with marginal and median black well separated, the median when broadened sharply narrowing or obsolete to inner margin 18k.
- 18k. Median band of hind wing rather even in width, reaching practically to inner margin, and not much narrowed below Cu_2 ; subapical bar on under side so far as examined suffusing out to outer margin below, enclosing the white marginal spots, and leaving only fine black terminal line and outlines (Figs. 12, 13, types) *m. elevata*.
- 18k. Median band on hind wing patch-like, especially in female, where it ends abruptly or is very weak below 2d A (Fig. 6) *m. beebei*.
- 18l. Fore wing with a yellow postmedial fascia *m. messenoides*.
- 18l. Fore wing all black and reddish *m. deceptus*.

The pattern formed by these (and more) races and forms is a curious double one. In the case of the types with normal *Mechanitis* coloring the variation seems local, but so subdivided that the majority of types are represented by single spots; only *pannifera* and *fallax* have wide distributions. On the other side the forms that are dominantly red (with little or no yellow) or black (with or without yellow) form a belt along the eastern foothills of the Andes from Colombia to Bolivia, extending out on the Amazonian plain as far as it remains hilly and well-drained (to La Chorrera in the Putumayo Valley, and to the extreme southeast corner of Colombia on the Rio Negro). I have a single specimen also of normal *mazæus* from Caripito, Venezuela, taken with the block of *beebei*, and a totally normal *messenoides* labelled French Guiana. Where these specimens come from the same localities as tricolored forms they may show a slight flavor of the special local pattern (e.g., the Caripito specimen) or not. From the Chanchamayo south I have seen only these bicolored types.

Mechanitis mazæus beebei, new race (Fig. 6, paratype)

Ground pale tawny, about like *fallax*, paler than most races of *mazæus*. Postmedial band yellow, tending to shade into the tawny base, with a little

yellow sealing in outer part of cell, but usually none in the middle part of cell Cu_1 ; subterminal fascia yellow, shaded with orange in varying proportion. Black pattern on fore wing somewhat reduced; the spot in cell small and round, two well separated spots at end of cell, spot in base of cell Cu_1 small, though triangular. Subapical band rather large, slightly diffuse, about as wide as the following but much narrower than the preceding black bands, generally extending below vein M_2 , often to vein M_3 , but tapering off and curving around, not very close to the margin. Black streak along base of A strong, usually more than twice as wide as the tawny stripe on inner margin. Hind wing tawny, without yellow in cell; the median black stripe very thick, much wider than the following tawny band, widest from M_2 to Cu_2 , in the male gradually tapering from Cu_2 to inner margin, which it almost reaches, in the female much reduced beyond Cu_2 or even absent, most often represented by two or three small shade-spots. Border narrow, roughly a third as wide as median stripe in male; in female wider, though hardly as wide as the preceding tawny band, and deeply toothed between veins, but with no tendency to fuse with the median stripe. Under side similar, the subapical stripe of fore wing larger, often indented by the black areas around the marginal white dots, but usually leaving a distinct black terminal line about 1 mm. wide; hind wing with marginal black nearly divided into triangles in both sexes, enclosing conspicuous white dots, not nearly meeting the median band, which is also more dentate than above.

The short oval median stripe of hind wing above will distinguish this race from all others, and with the general light color makes it a mimic of the local *Melinæa m. aurantia*, though not as a rule so extreme. Closest to it is a population from the vicinity of the Huallaga basin in Peru (south of *williamsi* but overlapping with it) in which the banding of the hind wing is more normal and the tawny apical stripe below is wider, normally resting on the margin, leaving only a black fringe.

Caripito, Monagas, Venezuela, holotype March 15, 1942 (Beebe and Fleming), 12 paratypes May, 1937 (Anduze), and March to May, 1942 (Beebe and Fleming), also in the Museum of Natural History, Caracas.

M. mazæus bipuncta, new race (Fig. 7, holotype)

Fore wing with base and inner margin light tawny out to end of cell and up to the comma mark; pm. area clear yellow, unusually broad, extending two-fifths way from end of cell to apex, its outer end nearly confined to cell M_3 , but extending somewhat across vein Cu_1 to the comma mark; black spot in outer part of cell small and rounded, at end of cell small, at lower angle; the usual spot at upper angle represented by a shade of deeper tawny which may contain a small black spot wholly above the cell; no spot in base of cell Cu_1 ; comma mark moderately heavy, a good-sized round spot, connected by a black band above its middle to the black border, as most usual in *mazæus*

forms. Apex black with well marked, almost wholly yellow subapical stripe. Stripe on inner margin moderate, even to two-thirds wing, leaving a narrower tawny inner margin. Hind wing tawny, the usual median stripe and border about equally wide, and separated by a waved tawny stripe about half as wide. Under side similar with large white marginal spots on both wings; fore wing with subapical stripe stronger and more tawny, spot in cell larger, and more or less traces of the spot in base of cell Cu_1 ; hind wing with a strong black costal stripe. 65 mm.

Surukum Basin, Upper Caroni River, Venezuelan Guiana, December, 1941 (Pablo Anduze), five females in Cornell University collection. The small size and peculiar pattern indicates that the local model is probably the local *Ceratinia mutilla* strain, which was much commoner than either the local *M. polymnia* or itself. A single specimen of *M. m. pannifera* was also taken, but perhaps not at the identical spot. This race is nearest *visenda*, from south of the Amazon, but easily distinguished by the lack of the costal spot and spot in cell Cu_1 , and much larger comma-mark.

M. limnæa Forbes (Fig. 8, holotype)

This tiny species really is very close to *polymnia* in most ways, though it has a distinctive look. The best distinguishing character is probably the combination of a very heavy bar or spots at end of cell with the extreme reduction or absence of the spot in the cell. *M. mazæus bipuncta* looks at first glance the same, but in it the black at end of cell is also reduced, and the border of hind wing shows the extensions between the veins distinctive of *mazæus*, while it is narrow on both sides in *limnæa*. It should be taken out in the key at alternative 7 by these characters. *M. forbesi* Bryk is a plain synonym of *limnæa*, since the specimen discussed in my first paper under *mantineus* was made one of the types of *limnæa*. The holotype, by the way, was male.

M. m. elevatus Riley (Figs. 12, 13, types). We have a fairly typical pair from Teffé, and specimens transitional to *williamsi* Fox from Oxapampa and Chuchurras, eastern Peru.

A Colombian specimen in the National Museum, without exact locality, suggests hybridism, perhaps of *polymnia* with *lycidice*. It would key to *veritabilis*, having the tawny anal area connected to the basal tawny, but the bar at end of cell joined to the comma mark into a solid black fascia, and the antennæ largely black.

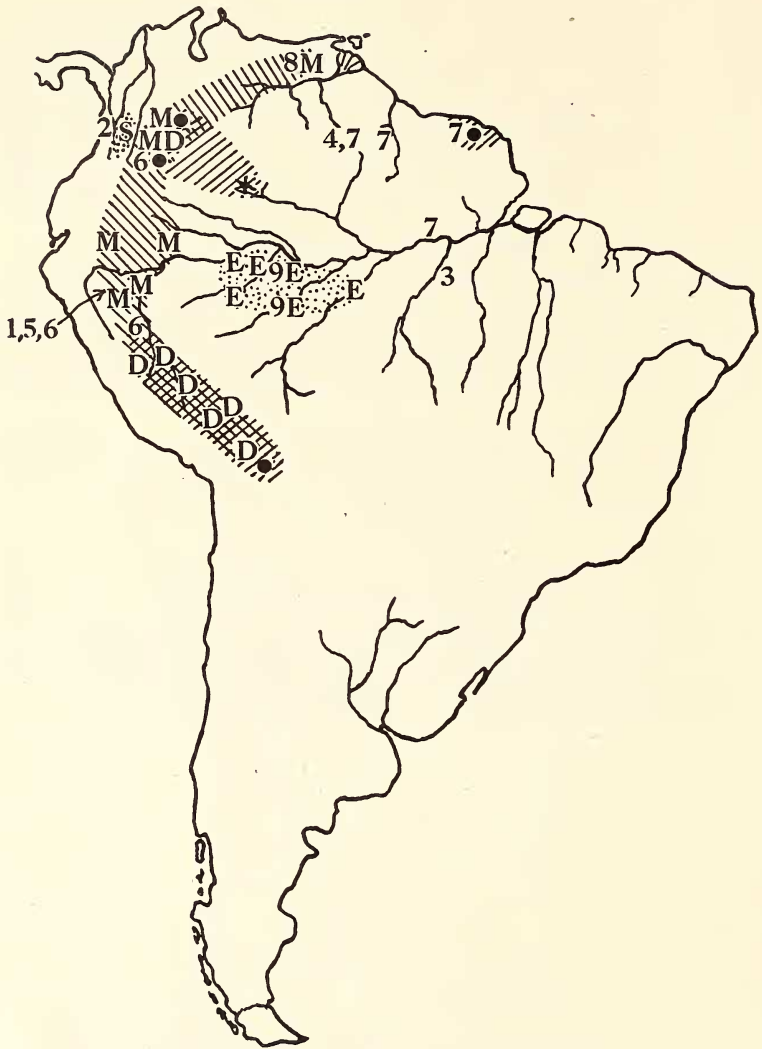
But the postmedial band is much wider toward outer margin than in any form except *solaria*, covering half of cell M_2 as well as the whole of cell M_3 . In contrast the costal half of the band is not widened. The black median band on hind wing is widened, above, like *mazæus* and *lycidice* forms, but much reduced below (like *lycidice*, but not *mazæus* or *polymnia*, etc.) and there is no apical tawny below. The habitus is most suggestive of *lycidice*, but I have never seen a specimen with so little black.

We may also note the following corrections in Bryk's catalogue:

Under *Melinæa brunnea*, *purusana*, *Mechanitis elevata*, *contracta*, *Hypothyris wickhami*, *clara*, *medea* and *virgilini* and *Hyaliris flavigera*, the volume number in the Riley reference should be 52, not 32.

P. 488, under *isthmia*, reduce *californica* to a pure synonym. The specimens were doubtless collected in Panama by some traveler in the days when that was the comfortable way to go to California.

P. 494. *M. p. nesæa* Hübner. Transfer to *lycidice* on p. 490, where the name will combine with *nessæa* Haensch. I find this method of listing minor misprints and emendations of names as separate entries extremely confusing; and in this particular case it was evidently too confusing for Bryk himself.



MAP 1. Distribution of *M. mazæus* forms

Shading slanting down: bicolored races: D, *deceptus* and *nigroapicalis*; M, *mazæus* and *jurimaguensis*.

Shading slanting up: races with solid black apical area: D, *deceptus* and *nigroapicalis*; •, * *messenoides*.

Stippling: races with darkened ground: S, *septentrionalis*; E, *egaënsis*, *obscura*, *contracta*, Madeira race.

Numbers; normally colored races: 1, *lucifera*; 2, *werneri*; 3, *visenda*; 4, *bipuncta*; 5, *williamsi*; 6, *fallax*; 7, *pannifera*; 8, *beebei*; 9, *elevata*.



MAP 2. Distribution of *M. polymnia* forms. A, *angustifascia*; C, *casa-branca*; Ch, *chimbazona*; M, *mauensis*; P, *polymnia*; Pl, *plagigera*; S, *solaria*.

PLATE I

Types of Forbes Species

- Figure 1. *Melinæa comma*, holotype. Chanchamayo, Peru.
 Figure 2. *Melinæa isocomma*, holotype. Upper Rio Negro, East Colombia, 800 M., Fassl.
 Figure 3. *Melinæa mneme aurantia*, holotype. Caripito, Monagas, Venezuela, July 19, 1937, Pablo Anduze.
 Figure 4. *Mechanitis polymnia mauensis*, paratype. Centenario, near Maués, Amazons, Brazil, August, 1937, F. Wucherpfennig.
 Figure 5. *Mechanitis polymnia solaris*, holotype. El Chorro, Sucre, Venezuela, 800 M., June 27, 1937, Pablo Anduze.
 Figure 6. *Mechanitis mazæus beebei*, paratype. Caripito, Monagas, Venezuela, April 24, 1942, Beebe and Fleming.
 Figure 7. *Mechanitis mazæus bipuncta*, holotype. Surukum Basin, Upper Caroni Valley, Venezuela, December, 1941, Pablo Anduze.
 Figure 8. *Mechanitis limnæa*, holotype. St. Laurent, Maroni River, French Guiana.
 Figure 9. *Mechanitis mazæus*, race. Manicore, Rio Madeira, Brazil, December, 1937, F. Wucherpfennig.

PLATE II

Types of species in British Museum

- Figure 10. *Mechanitis mazæus pannifera* Butler, holotype. Obidos forest, Amazons, Brazil, February 13, 1874, Traill.²
 Figure 11. *Mechanitis mazæus visenda* Butler, holotype. Trovador, R. Tapajós, Brazil, Lat. 4°15' S., March 13, 1874, Traill.²
 Figure 12. *Mechanitis mazæus elevata* Riley, type male. Allianca, Canutama, Rio Purús, Brazil, September, 1913, E. H. W. Wickham.
 Figure 13. Same, female type, with same data.
 Figure 14. *Mechanitis mazæus contracta* Riley, type male. Same data.
 Figure 15. Same, female type, with same data.
 Figure 16. *Mechanitis mazæus obscura* Butler, type male. Ega, Amazons, Bates.
 Figure 17. Same, female type, with same data.
² As spelled on original labels of the types.